3COM

Installation and User Guide

Gigabit EtherLink™ Server Network Interface Cards (NICs)

Gigabit EtherLink Server NIC (3C985B-SX)
1000BASE-SX PCI Fiber NIC (710011, 710012)
10/100/1000BASE-T PCI NIC (3C986-T, 710024, 710025)
1000BASE-LX PCI Fiber NIC (710026)

http://www.3com.com/
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DOC050059-01
Published May 2001

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Preface

About This Guide

This guide covers the installation of the 3Com Gigabit EtherLink Server network interface card (NIC). For configuration instructions, see the user guide for your operating system located on the Gigabit Ethernet Server NIC CD.

This guide describes how to:

- Physically install the NIC in your system.
- Connect network cables.
- Interpret the NIC LEDs.

The procedures assume that you are a system or network administrator experienced in installing similar hardware.

Other Important Documentation

The 3Com Gigabit EtherLink Server CD contains documentation for installing, configuring, and troubleshooting the NIC. The manuals are included as PDF files which can be read and printed using the free multi-platform Acrobat® Reader software available from the Adobe Systems Incorporated website at http://www.adobe.com.

- To access the manual for Windows NT 4.0 and Windows 2000, open the WINDOWS.PDF file on the CD.
- To access the manual for NetWare, open the NETWARE.PDF file on the CD.

Contacting 3Com

3Com provides easy access to technical support information through a variety of services. This appendix describes these services.

Information contained in this appendix is correct at time of publication. For the most recent information, 3Com recommends that you access the 3Com Corporation World Wide Web site.

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Online Technical Services

3Com offers worldwide product support 24 hours a day, 7 days a week, through the following online systems:

- World Wide Web site
- 3Com Knowledgebase Web Services
- 3Com FTP site
- 3Com Bulletin Board Service (3Com BBS)
- 3Com Facts℠ Automated Fax Service

World Wide Web Site

To access the latest networking information on the 3Com Corporation World Wide Web site enter this URL into your Internet browser:

`http://www.3com.com/`

This service provides access to online support information such as technical documentation and a software library, as well as support options that range from technical education to maintenance and professional services.

3Com Knowledgebase Web Services

This interactive tool contains technical product information compiled by 3Com expert technical engineers around the globe. Located on the World Wide Web at http://knowledgebase.3com.com, this service gives all 3Com customers and partners complementary, round-the-clock access to technical information on most 3Com products.

3Com FTP Site

Download drivers, patches, software, and MIBs across the Internet from the 3Com public FTP site. This service is available 24 hours a day, 7 days a week.

To connect to the 3Com FTP site, enter the following information into your FTP client:

- Hostname: **`ftp.3com.com`**
- Username: **`anonymous`**
- Password: **`<your Internet e-mail address>`**

NOTE: You do not need a user name and password with Web browser software such as Netscape Navigator and Internet Explorer.

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3Com Bulletin Board Service

The 3Com BBS contains patches, software, and drivers for 3Com products. This service is available through analog modem or digital modem (ISDN) 24 hours a day, 7 days a week.

Access by Analog Modem

To reach the service by modem, set your modem to 8 data bits, no parity, and 1 stop bit. Call the telephone number nearest you:

Country (Region)	Data Rate	Telephone Number
Australia	Up to 14,400 bps	61 2 9955 2073
Brazil	Up to 28,800 bps	55 11 5181 9666
France	Up to 14,400 bps	33 1 6986 6954
Germany	Up to 28,800 bps	4989 62732 188
Hong Kong	Up to 14,400 bps	852 2537 5601
Italy	Up to 14,400 bps	39 2 27300680
Japan	Up to 14,400 bps	81 3 5977 7977
Mexico	Up to 28,800 bps	52 5 520 7835
P.R. of China	Up to 14,400 bps	86 10 684 92351
Taiwan	Up to 14,400 bps	886 2 377 5840
U.K.	Up to 28,800 bps	44 1442 438278
U.S.A.	Up to 53,333 bps	1 847 262 6000

Access by Digital Modem

ISDN users can dial in to the 3Com BBS using a digital modem for fast access up to 64 Kbps. To access the 3Com BBS using ISDN, call the following number:

1 847 262 6000

3Com Facts Automated Fax Service

The 3Com Facts automated fax service provides technical articles, diagrams, and troubleshooting instructions on 3Com products 24 hours a day, 7 days a week.

Call 3Com Facts using your Touch-Tone telephone:

1 408 727 7021

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Support from Your Network Supplier

If you require additional assistance, contact your network supplier. Many suppliers are authorized 3Com service partners who are qualified to provide a variety of services, including network planning, installation, hardware maintenance, application training, and support services.

When you contact your network supplier for assistance, have the following information ready:

- Product model name, part number, and serial number
- A list of system hardware and software, including revision levels
- Diagnostic error messages
- Details about recent configuration changes, if applicable

If you are unable to contact your network supplier, see the following section on how to contact 3Com.

Support from 3Com

If you are unable to obtain assistance from the 3Com online technical resources or from your network supplier, 3Com offers technical telephone support services. To find out more about your support options, please the 3Com technical telephone support phone number at the location nearest you.

When you contact 3Com for assistance, have the following information ready:

- Product model name, part number, and serial number
- A list of system hardware and software, including revision levels
- Diagnostic error messages
- Details about recent configuration changes, if applicable

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Here is a list of worldwide technical telephone support numbers:

Country (Region)	Telephone Number
Asia Pacific Rim	
Australia	1 800 678 515
Hong Kong	800 933 486
India	+61 2 9937 5085
Indonesia	001 800 61 009
Japan	0031 61 6439
Malaysia	1800 801 777
New Zealand	0800 446 398
Pakistan	+61 2 9937 5085
Philippines	1235 61 266 2602
P.R. of China	10800 61 00137 or 021 6350 1590
Singapore	800 6161 463
S. Korea	
From anywhere in S. Korea:	00798 611 2230
From Seoul:	(0)2 3455 6455
Taiwan	0080 611 261
Thailand	001 800 611 2000
Europe	
From anywhere in Europe, call:	+31 (0)30 6029900 phone +31 (0)30 6029999 fax
Europe, South Africa, and Middle East From the following countries, you may use the toll-free numbers:	
Austria	0800 297468
Belgium	0800 71429
Denmark	800 17309
Finland	0800 113153
France	0800 917959
Germany	0800 1821502
Hungary	00800 12813
Ireland	1800 553117
Israel	1800 9453794
Italy	1678 79489
Netherlands	0800 0227788
Norway	800 11376
Poland	00800 3111206
Portugal	0800 831416
South Africa	0800 995014
Spain	900 983125
Sweden	020 795482
Switzerland	0800 55 3072
U.K.	0800 966197

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Country (Region)	Telephone Number
Latin America	
Argentina	AT&T +800 666 5065
Brazil	0800 13 3266
Chile	1230 020 0645
Colombia	98012 2127
Mexico	01 800 CARE (01 800 2273)
Peru	AT&T +800 666 5065
Puerto Rico	800 666 5065
Venezuela	AT&T +800 666 5065
North America	1-800-527-8677

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Returning Products for Repair

Before you send a product directly to 3Com for repair, you must first obtain an authorization number. Products sent to 3Com without authorization numbers will be returned to the sender unopened, at the sender's expense.

To obtain an authorization number, call or fax:

Country (Region)	Telephone Number	Fax Number
Asia, Pacific Rim	+65 543 6500	+65 543 6348
Europe, South Africa, and Middle East	+31 30 6029900	+31 30 6029999
Latin America	1 408 326 2927	1 408 326 3355
From the following countries, you may call the toll-free numbers; select option 2 and then option 2:		
Austria	0800 297468	
Belgium	0800 71429	
Denmark	800 17309	
Finland	0800 113153	
France	0800 917959	
Germany	0800 1821502	
Hungary	00800 12813	
Ireland	1800 553117	
Israel	1800 9453794	
Italy	1678 79489	
Netherlands	0800 0227788	
Norway	800 11376	
Poland	00800 3111206	
Portugal	0800 831416	
South Africa	0800 995014	
Spain	900 983125	
Sweden	020 795482	
Switzerland	0800 55 3072	
U.K.	0800 966197	
U.S.A. and Canada	1-800-527-8677	1 408 326 7120

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1 Installing the NIC

Use the procedures in this section to install the NIC and perform initial configuration in most systems. For details about performing these tasks on your particular system, refer to the manuals that were supplied with your system.

System Requirements

Before installing the NIC, make sure your system meets the requirements listed in the following table:

System	Requirements
Windows NT	
Hardware	■ Pentium-based computer that meets Windows NT 4.0 software requirements ■ One open 32-bit or 64-bit PCI slot ■ 128MB RAM (minimum)
Operating System	Microsoft Windows NT 4.0 (server or workstation) with Service Pack 4 or later
NIC Software	3Com Gigabit Etherlink Server NIC driver software for Windows NT.
Windows 2000	
Hardware	■ Pentium-based computer that meets Windows 2000 software requirements ■ One open 32-bit or 64-bit PCI slot ■ 128MB RAM (minimum)
Operating System	Microsoft Windows 2000 (server or professional), and Microsoft Windows 2000 Advanced Server
NIC Software	3Com Gigabit Etherlink Server NIC driver software for Windows 2000.

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System	Requirements
Novell Netware	
Hardware	■ Pentium-based computer that meets Novell NetWare 4.2 and 5.1 software requirements ■ One open 32-bit or 64-bit PCI slot ■ 128MB RAM (minimum)
Operating System	■ Novell NetWare 5.1, with the most recent NetWare 5 Support Pack ■ Novell NetWare 4.2 with the most recent patches and support available from Novell technical support (http://support.novell.com)
NIC Software	3Com Gigabit Etherlink Server NIC driver software, version for Novell NetWare. See the CD for these files: ■ `3c986.lan` (network device driver file) ■ `3c986.ldi` (information used by installation program)

Important Components

Included with your NIC is the following:

- Anti-static bag (used for protecting the NIC when stored or shipped). Keep the NIC in its packaging until ready for installation.
- 3Com Gigabit Etherlink Server CD with NIC driver software and documentation.

Inform your network supplier of any missing or damaged items. If you need to return the NIC, you must pack it in the original (or equivalent) packing material or the warranty will be voided.

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Safety Precautions

CAUTION: The NIC is being installed in a system that operates with voltages that can be lethal. Before you remove the cover of your system, you must observe the following precautions to protect yourself and to prevent damage to the system components.

- Remove any metallic objects or jewelry from your hands and wrists.
- Make sure to use only insulated or nonconducting tools.
- Verify that the system is powered OFF and unplugged before accessing internal components.
- Installation or removal of NICs must be performed in a static-free environment. The use of a properly grounded wrist strap or other personal anti-static devices and an anti-static mat is strongly recommended.

Pre-Installation Checklist

1. **Check that your system meets the hardware and software requirements listed in the table in "System Requirements" on page 9.**
2. **Verify that your system is using the latest firmware or BIOS.**
3. **Review the information in the `readme` file on the 3Com Gigabit Etherlink Server CD for important information not available at the time this manual was printed.**

NOTE: If you acquired the NIC software on a floppy disk or from the 3Com website, please check the appropriate source for the most recent information.

4. **If the system is active, shut it down.**
5. **When the system shutdown is complete, power OFF your system.**
6. **Holding the NIC by the edges, remove it from its shipping package it and place it on an anti-static surface.**
7. **Check the NIC for visible signs of damage, particularly on the card's edge connector. Never attempt to install any damaged NIC.**

   If the NIC is damaged, report it to your 3Com Customer Support Representative. For more information, see "Contacting 3Com" on page 1.

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NIC Installation

To install a 3Com Gigabit Etherlink Server NIC in your system, perform the following procedure.

1 **Observe all precautions and pre-installation instructions on page 11.**

Before installing the NIC, ensure the system power is OFF, and proper electrical grounding procedures have been followed.

2 **Remove the system cover, and select any empty PCI slot.**

If you do not know how to identify a PCI slot, refer to your system documentation.

3 **Remove the blank cover-plate from the slot that you selected. Retain the screw so that it can be replaced later.**

4 **Holding the NIC by the edges, align the NIC's connector edge with the PCI connector dock in the system.**

NOTE: The connector dock in a 32-bit PCI slot is shorter than in a 64-bit PCI slot. Although the NIC is designed to fit in either slot type, when installed in a 32-bit PCI slot, part of the NIC's connector edge will remain undocked. This is perfectly normal.

5 **Applying even pressure at both corners of the card, push the NIC until it is firmly seated in the PCI slot.**

CAUTION: Do not use excessive force when seating the NIC, as this may damage the system or the NIC. If the card resists seating, remove it from the system, realign it, and try again**.**

When properly seated, the NIC's port connectors will be aligned with the slot opening, and its faceplate will be flush against the system chassis.

6 **Use the screw removed above to secure the NIC in the PCI card cage.**

7 **Replace the system cover and disconnect any personal anti-static devices.**

8 **Power the system on.**

Once the system returns to proper operation, the NIC hardware is fully installed. You must next connect the network cables (see page 13) and install the NIC driver software (see Chapter 2).

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Connecting the Network Cables

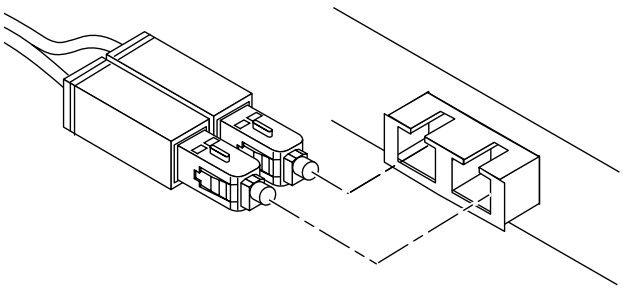
1000Base-SX Fiber NIC

1 Prepare an appropriate cable.

The following table lists cable characteristics required for connecting to 1000Base-SX port:

Medium Diameter		Frequency	Cable Type	Operating Range
SX	62.5 Microns	Shortwave (850 nanometers)	Multimode fiber	2 to 275 meters (6.5 to 902 feet)
	50 Microns	Shortwave (850 nanometers)	Multimode fiber	2 to 550 meters (6.5 to 1804 feet) (in compliance with IEEE 802.3-1999)

2 Connect one end of the cable to the NIC, as shown in the following diagram.



3 Connect the other end of the cable to a Gigabit Ethernet network port.

Attach the cable connector so that the TX (transmit) port on the NIC is connected to the RX (receive) port of the device at the other end of the cable.

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10/100/1000Base-T NIC

The NIC has one RJ-45 connector used for attaching the system to an Ethernet copper-wire segment. When automatic link negotiation is disabled, the port can be configured for 10Mbps, 100Mbps, or 1000Mbps signaling and either half-duplex or full-duplex operation.

1 Prepare an appropriate cable.

The following table lists the cable characteristics for connecting to 10/100/1000Base-T ports:

Port Type	Connector	Media	Maximum Distance
10Base-T	RJ-45	Cat. 3, 4, or 5 UTP	100 meters (325 feet)
100/1000Base-T	RJ-45	Cat. 5 UTP	100 meters (325 feet)

NOTE: 1000Base-T signaling requires four twisted pairs of Category 5 balanced cabling, as specified in ISO/IEC 11801:1995 and EIA/TIA-568-A (1995), and tested using procedures defined in TIA/EIA TSB95.

2 Connect one end of the cable to the NIC.

3 Connect the other end of the cable to an RJ-45 Ethernet network port.

The NIC port LEDs are not functional (they will not reflect port link or data status) until the NIC driver software is installed.

See the next chapter for driver installation and configuration instructions.

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2 Installing the NIC Software

After installing the NIC, the NIC software must be installed and configured. Follow the steps for your operating system.

WARNING: If you are using VLANs or teaming, you cannot use 3Com Dynamic*Access* software.

If you have intermediate drivers for any third-party NICs installed, it will cause a conflict with the 3Com Dynamic*Access* intermediate drivers. Remove those intermediate drivers.

Installing the Software in Windows NT 4.0

The NIC must be physically installed in your server or workstation prior to installing the driver software. See Chapter 1, "Installing the NIC" for details.

A network device driver must be installed before the NIC can be used with your Windows NT system. To install the NIC software for Windows NT, perform the following procedure.

WARNING: Make sure that the correct and latest BIOS and firmware are installed on your system to ensure that the system works correctly. Failure to do so may result in system failure.

NOTE: Before installing the drivers for any new 3Com Gigabit EtherLink Server NIC, any previously installed 3Com Gigabit EtherLink Server NIC drivers prior to version 2.2 must be removed.

If there are no NIC drivers displayed in the Network Adapters window, or if the drivers shown are version 2.2 or higher, proceed with the installation.

If older NIC drivers are present, perform the procedure under "Removing the Driver Software" in the *3Com Gigabit EtherLink Server NIC User's Guide for Windows 2000 and Windows NT*. To update NIC versions from 2.2 to the most recent release, perform the procedure under "Updating the Driver Software" in the *user's guide*.

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1 **Verify that Windows NT is upgraded with Service Pack 4 (or the latest service pack).**

NOTE: If you attempt to install the NIC driver on a newly installed Windows NT system (without Service Pack 4 or the most recent service pack), the driver will not install. The system will display a message indicating that you must exit the installation and first install Service Pack 4 or later. Note that 3Com has tested and supports Service Pack 6.0a only. For Backup Domain Controller (BDC) installation, see the readme file on the CD for more information.

2 **Start your Windows NT system and log in.**

You must have Network Administrator privileges to install the driver software.

3 **Open the Windows Start menu and select *Settings, Control Panel*.**

4 **Double-click the Network icon.**

5 **When the Network window opens, select the *Adapters* tab.**

6 **Click *Add*.**

7 **When the Select Network Adapter window opens, click *Have Disk...*.**

8 **When prompted, insert the 3Com Gigabit Etherlink Server CD into your system's CD-ROM drive, type the path to the driver, and select *OK*.**

To install the NIC driver software for Windows NT, enter the following path:

```
e:\
```

Where "`e:`" is the designation of the CD-ROM drive on your system.

NOTE: If you acquired the NIC software on floppy disk or from the 3Com website, enter the path to where the driver files reside on your system.

9 **In the Select OEM Option window the name of the NIC is highlighted. Click *OK*.**

The Driver Properties window opens.

When the properties window appears, the NIC Status and Configuration tab is shown. The options under this tab are used for configuring basic NIC properties. For configurable options, see "Modifying Configuration Parameters" on page 18.

10 **Perform any necessary configuration changes, if needed. Click *Close* in the Driver Properties window.**

11 **In the Network window, click *Close*.**

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NOTE: If other NICs in your system use TCP/IP bindings, the TCP/IP Properties window opens.

12 **Perform any necessary TCP/IP configuration and click *OK* when finished.**

For help in configuring TCP/IP protocol, consult your Microsoft Windows NT 4.0 documentation.

13 **When prompted to restart your computer, click *Yes*.**

The system restarts, using the new configuration settings.

14 **When the system returns to proper operation, verify that the NIC port LEDs operate as described in the 3Com Gigabit EtherLink Server NIC User's Guide for Windows 2000 and Windows NT.**

Installing the Software in Windows 2000

The 3Com Gigabit Etherlink Server NIC must be physically installed in your server or workstation prior to installing the driver software. See Chapter 1, "Installing the NIC" for details.

When the Windows 2000 system first starts up after installing a new hardware device such as a NIC, the system automatically detects the new hardware and prompts you to install the driver software for the device.

To install the NIC software for Windows 2000:

1 **Verify that the Windows 2000 system is upgraded to the latest version.**

2 **Start your Windows 2000 system and log in.**

You must have Network Administrator privileges to install the driver software.

When you boot up the Windows 2000 system after installing the NIC, a series of "Found New Hardware Wizard" windows appear.

3 **In the Install Hardware Device Drivers window, click *Search for a suitable driver for my device* (recommended), then click *Next*.**

4 **In the Locate Driver Files window, check the CD-ROM drives box.**

5 **When prompted, insert the NIC CD into your system's CD-ROM drive, type the path to the driver, and select *OK*.**

The path on the CD-ROM is as follows:

```
e:\
```

Where "e" is the designation of the CD-ROM drive on your system.

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NOTE: If you acquired the NIC software on floppy disk or from the 3Com website, enter the path to where the driver files reside on your system.

6 **In the Driver Files Search Results window, verify that the correct path to the driver software is shown, then click *Next*.**

Once installation of the driver software has been completed, you are ready to configure NIC properties. For details, see the next section, "Modifying Configuration Parameters"

Modifying Configuration Parameters

This section describes the NIC configuration options in Windows NT 4.0 and Windows 2000.

Although the default values should be appropriate in most cases, you may change any of the available options to meet the requirements of your specific system. Ensure that the NIC Status and Configuration tab is shown in the foreground of the Driver Properties window (click the tab if necessary).

The following options should be displayed:

- **Adapter (Windows NT 4.0 only)**

  This field identifies which 3Com Gigabit Etherlink Server NIC is being configured. In a Windows NT 4.0 system with multiple 3Com Gigabit Etherlink Server NICs, select this field to access a pull-down list of the available NICs and teams. Each 3Com Gigabit Etherlink Server NIC installed in the system is labeled with a unique instance number. Typically, the first NIC detected is instance 1, the next is instance 2, and so on.

- **Link Negotiation**
  - When checked (default), 802.3-1999 compliant Gigabit Ethernet link negotiation is enabled. All 3Com Gigabit EtherLink Server NICs use link negotiation by default.
  - When unchecked, link negotiation is disabled and only link signal detection is used. Use this setting when connecting to Ethernet equipment that does not support link negotiation, or if there is a problem establishing a link between the NIC and the connecting device. Unless otherwise specified, the default signaling speed for the Base-SX NIC and the 10/100/1000Base-T NIC is 1Gbps.

    When link negotiation is disabled, be sure that the connecting device uses the same duplex and speed settings.

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NOTE: When link negotiation is on, the user-configured link speed and duplex settings are ignored in favor of automatically determined settings.

- **Full Duplex Enabled**

  When link negotiation is unchecked, this parameter sets the duplex mode. You can select either half-duplex or full-duplex operation.

  - When checked, full-duplex signaling is used (default).
  - When unchecked, half-duplex operation is used.

- **Tx Flow Control**
  - When Tx flow control is checked and link negotiation is enabled, the NIC negotiates 802.3x transmit flow control with the device at the other end of the link. If 802.3x flow control is supported by the other device, Tx flow control is enabled.
  - When Tx flow control is checked and link negotiation is disabled, you must check Full Duplex Enabled in order for Tx flow control to work properly. Tx flow control will not function under half duplex operation.
  - When Tx flow control is unchecked (default), or when Full Duplex Enabled is unchecked, transmit flow control is disabled.

- **Rx Flow Control**
  - When Rx flow control is checked (default) and link negotiation is enabled, the NIC negotiates 802.3x receive flow control with the device at the other end of the link. If 802.3x flow control is supported by the other device, Rx flow control is enabled.
  - When Rx flow control is checked and link negotiation is disabled, you must check Full Duplex Enabled in order for Rx flow control to work properly. Rx flow control will not function under half duplex operation.
  - When unchecked, or when Full Duplex Enabled is unchecked, receive flow control is disabled.

- **Port Link Speed**
  - When link negotiation is disabled, this parameter sets the port link speed. You can select link speed to be either 10Mbps, 100Mbps, or 1Gbps. When the port link is connected, the selected link speed is indicated to the right of this field.

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Installing the Software in NetWare

This section describes how to perform the following tasks:

- Verify that the required OS support files are installed on the server and the NetWare pre-installation parameters are correctly set.
- Install the driver software in the Novell NetWare environment.

Network administrators can use more than one method to install device drivers on a NetWare server. This section does not attempt to provide detailed installation instructions for each method. Several commonly used methods to install a driver on a NetWare server are listed in the *3Com Gigabit EtherLink Server NIC User's Guide for Novell NetWare*, with brief descriptions of the advantages and drawbacks of using each method.

NOTE: If you are installing NetWare 5.1 for the first time on the server, NetWare uses the `nwconfig` program to install the NIC driver during the installation of the operating system.

During the installation process, Novell's Internetworking Configuration (`inetcfg.nlm`) program requires you to bind a protocol to the driver.

NetWare Pre-Installation Requirements

Before you can use the NIC in your Novell NetWare system, a network device driver must be installed.

First, make sure that the NIC is physically installed in your system. Typically, NetWare OS software must already be running on the server. Make sure that your server meets the hardware and operating system software requirements described in the following table.

Install the latest support pack files to ensure that the NIC functions correctly. The support pack or patch file(s) needed for the operating system running on your server are indicated below:

NetWare OS	File Name	File(s) to be Installed
5.1	NetWare 5.1 Support Pack 1 (or the latest support pack)	NW51SP1.EXE (or latest file)
4.2	Support Pack 9 (or the latest support pack)	NW4SP9.EXE (or latest file)

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NOTE: If you are installing NetWare 5.1 for the first time on a server, you install the NIC driver during the OS installation procedure. You then install the NetWare 5.1 support pack after you have successfully installed NetWare 5.1 on the server.

To get the latest support pack files, go to the Novell support website at http://support.novell.com.

Using the table above as a guide, select and download the latest support pack or patch file(s) for the operating system running on your server.

Installing the NIC Driver for NetWare

Use one of two procedures for installing the NIC software, depending on whether NetWare is already running on the server or if you are performing an initial installation of the NetWare 5.1 operating system:

- If NetWare is already running on the server, you can edit the AUTOEXEC.NCF and STARTUP.NCF files to load files and configure the NIC driver. For the procedure, see "Installing the Driver: NetWare Already Installed" on page 21.
- If you are installing the NIC software as part of an initial installation of NetWare 5.1, edit the STARTUP.NCF file and configure the NIC driver during the normal NetWare 5.1 installation process. **This version of the operating system does not allow you to allocate the actual number of receive buffers required by the NIC until installation is complete. Install the driver software using the procedure described in "Installing the Driver: Initial Installation of NetWare 5.1" on page 24.**

Installing the Driver: NetWare Already Installed

This section provides basic guidelines for installing the NIC driver on a server already running the NetWare operating system. This procedure works for NetWare 4.2 and 5.1.

1. **Insert the 3Com Gigabit EtherLink Server CD into the appropriate CD-ROM drive and mount the CD on the server.**
2. **Copy the 3c986.LAN and the 3c986.LDI files into the \system directory.**

   The NetWare NIC drivers are located in the NetWare directory on the CD.
3. **Edit the STARTUP.NCF file. Set the packet receive buffers parameters for the number of NICs installed in the system.**

   To ensure optimum performance, add at least 1024 additional packet receive buffers for each NIC installed in your system.

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NOTE: Depending on your system configuration, the number of clients being supported, and other requirements, more than 1024 packet receive buffers may be needed for each NIC.

For more information, see "Editing the STARTUP.NCF File" in the *3Com Gigabit EtherLink Server NIC User's Guide for Novell NetWare*.

4 Edit the autoexec.ncf file and modify NIC load parameters. The NIC parameters that can be defined in the load statements are described in "NIC Load Parameters" on page 23.

Example: A valid autoexec.ncf file is shown below. One set of load and bind commands (in **bold**) is added for each type of frame the NIC is configured to support.

```
set Time Zone = PST8PDT
set Daylight Savings Time Offset = 1:00:00
set Start Of Daylight Savings Time = (APRIL
SUNDAY FIRST 2:00:00 AM)
set End Of Daylight Savings Time = (OCTOBER
SUNDAY LAST 2:00:00 AM)
set Default Time Server Type = SINGLE

# Note: The Time zone information mentioned
above
# should always precede the SERVER name.
set Bindery Context = O=3Com

file server name MARS
ipx internal net 34881EEE

load 3c986 slot=4 frame=Ethernet_802.2
name=3c986_1_e82_2
bind ipx 3c986_1_e82_2 net=aaaa

mount all

set immediate purge of deleted files = on
set upgrade low priority threads = on
set display spurious interrupt alerts = on
set display lost interrupt alerts = on
```


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NIC Load Parameters

Parameter	Descriptions
slot=n	Identifies the slot number for the specific 3Com Gigabit Etherlink Server NIC currently being configured. This parameter is not necessary if only a single NIC is installed. If multiple NICs are installed, you can view the list of slot numbers when loading the driver.
frame=type	Defines the frame type being used by this load instance. Valid types are: ■ Ethernet_802.2 ■ Ethernet_802.3 ■ Ethernet_ii ■ Ethernet_snap
link=n	Defines whether 802.3 compliant link negotiation is enabled/disabled. ■ A value of 1 (one) activates the IEEE 802.3 compliant link negotiation (default). All 3Com Gigabit EtherLink Server NICs use link negotiation by default. ■ A value of 0 (zero) enables link signal detection. Use this setting when connecting to Ethernet equipment that does not support link negotiation, or if there is a problem establishing a link between the NIC and the connecting device. Unless you specify otherwise, the default signaling speed for the 1000Base-SX and 10/100/1000Base-T NIC is 1Gbps. When link negotiation is off, be sure that the connecting device uses the same duplex and speed settings
duplex=n	If link negotiation has been disabled, you can select either half-duplex or full-duplex operation. ■ A value of 1 (one) enables full-duplex signaling (default). ■ A value of 0 (zero) enables half-duplex signaling.
name=text	The name assigned to this NIC (also specified in the bind statement).
speed=value	If link negotiation has been disabled, you can select port speed to be either *10* (Mbps), *100* (Mbps), or *1000* (Mbps).
rxflow=n	If link negotiation has been disabled, you can turn 802.3x receive flow control on or off. ■ A value of 1 (one), the default, allows the NIC to negotiate 802.3x receive flow control with the device at the other end of the link. If 802.3x flow control is supported by the other device, receive pause packets will be respected. ■ A value of 0 (zero) disables receive flow control.

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NIC Load Parameters (continued)

Parameter	Descriptions
txflow=n	If link negotiation has been disabled, you can turn 802.3x transmit flow control on or off. ■ A value of 1 (one), the default, allows the NIC to negotiate 802.3x transmit flow control with the device at the other end of the link. If 802.3x flow control is supported by the other device, transmit pause packets will be respected. ■ A value of 0 (zero) disables transmit flow control.
fdrfiltering=n	■ This option is ignored by NIC models 710011and 710012. For earlier models, set this value to 1 if the NIC is attached to a full-duplex repeater. Otherwise, set this value to 0 or leave it blank.
recvbuffers=n	■ This value is the number of packet receive buffers pre-allocated by the driver for the NIC. The default value is 512.

5 Save your revisions to the autoexec.ncf file and, if all NIC configuration has been completed, reboot the server.

Installing the Driver: Initial Installation of NetWare 5.1

This section provides information you need to install the NIC driver while performing a fresh install of the NetWare 5.1 operating system.

1 Copy the 3c986.LAN and 3c986.LDI files from the CD to a floppy disk.

2 Start the NetWare 5.1 installation and proceed as usual until you reach the Devices Detected screen.

3 When you are prompted for an unlisted driver, place the floppy disk into the appropriate drive. Press <*Insert*> and select the `3c986.LAN` driver.

4 When the driver configuration screen is displayed, choose *Select/Modify driver parameters and protocols*.

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5 Configure driver parameters, referring to the parameter descriptions below and in the following table.

```
Slot Number:
Node Address:
Link: auto
Duplex: full
Speed: 1000
RxFlowControl: allow
TxFlowControl: off
FDRFiltering: off
RecvBuffers:
Other:
Driver Version:
```

NIC Configuration Parameters

Parameter	Description
Slot Number	**This field is required for proper configuration.** Enter the slot of the specific 3Com Gigabit Etherlink Server NIC currently being configured. **CAUTION:** If this parameter is not correctly supplied and there is more than one NIC installed in the server, the installation program may crash the system. Use the listslot.nlm program to identify the slot where a NIC is installed.
Node Address	To override the default Media Access Control (MAC) address, specify a node address in this field. The expected range is 0060CF000000 through 0060CFFFFFFF
Link	When you select this field and press <*Enter*>, you are prompted to choose between "auto" and "off" settings: ■ The "auto" setting activates the IEEE 802.3 compliant link negotiation. All 3Com Gigabit EtherLink Server NICs use link negotiation by default. ■ When "off" is selected, only link signal detection is used. Use this setting when connecting to Ethernet equipment that does not support link negotiation, or if there is a problem establishing a link between the NIC and the connecting device. Unless you specify otherwise, the default signaling speed for the 1000Base-SX and 10/100/1000Base-T NICs is 1Gbps. **NOTE:** When link negotiation is off, be sure that the connecting device uses the same duplex and speed settings.

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NIC Configuration Parameters (continued)

Parameter	Description
Duplex	When you disable link negotiation while installing a 1000Base-SX or 10/100/1000Base-T NIC, you can select either half-duplex or full-duplex operation. If you select this field and press <*Enter*>, you are prompted to choose between "full" and "half" settings: ■ When "full" is selected, full-duplex signaling is enabled (default). ■ When "half" is selected, half-duplex signaling is used.
Speed	If link negotiation has been disabled, you can select port speed to be either 10Mbps, 100Mbps, or 1Gbps.
RxFlowControl	When you select this field and press <*Enter*>, you are prompted to choose between "allow" and "off" settings: ■ When "allow" is selected, and link parameter is set to "auto," the NIC negotiates 802.3x receive flow control with the device at the other end of the link. If the other device supports 802.3x flow control, Rx flow control is enabled. ■ When "off" is selected, or link parameter is "off," receive flow control is disabled.
TxFlowControl	When you select this field and press <*Enter*>, you are prompted to choose between "allow" and "off" settings. ■ When "allow" is selected, and link parameter is set to "auto," the NIC negotiates 802.3x transmit flow control with the device at the other end of the link. If the other device supports 802.3x flow control, Tx flow control is enabled. ■ When "off" is selected, or link parameter is "off," transmit flow control is disabled.
FDRFiltering	When you select this field and press <*Enter*>, you are prompted to choose between "on" and "off" settings: ■ Use "on" if the NIC is attached to a full-duplex repeater. ■ Use "off" or leave the field blank if the NIC is not connected to a full-duplex repeater. **NOTE:** FDRFiltering is ignored on NIC models 710011 and 710012. This parameter is included to maintain driver compatibility with earlier models.

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NIC Configuration Parameters (continued)

Parameter	Description
RecvBuffers	To ensure optimum NIC performance, the NIC driver has a default value of 512 packet receive buffers for each NIC installed on the network. **NOTE:** If performing an initial installation of NetWare 5.1, the install program does not let you allocate the actual number of packet receive buffers needed by the NIC. During installation, the RecvBuffers value should be set to 32, the minimum number of buffers the driver requires for each NIC. While this setting dramatically affects NIC performance, it allows installation of the operating system. Once installation is complete, you need to increase the number of buffers allocated to the system, as described in "Editing the STARTUP.NCF File" in the *3Com Gigabit EtherLink Server NIC User's Guide for Novell NetWare*.
Other	This parameter is reserved for future features or technical support use.
Driver Version	This information field displays the version of the driver software. This field cannot be edited.

6 **Ensure that you have set the RecvBuffers value to 32.**

7 **After NetWare 5.1 has been successfully installed, edit the STARTUP.NCF file: Set the packet receive buffers parameter to 1024 for each NIC in the system. For more information, see "Editing the STARTUP.NCF File" in the *3Com Gigabit EtherLink Server NIC User's Guide for Novell NetWare.***

8 **In the `autoexec.ncf` file, delete the packet receive buffers parameter (RecvBuffers=32) in the load statement for this NIC.**

Deleting the receive buffers phrase from the load statement resets the receive buffers parameter to the default value of 512 for this NIC.

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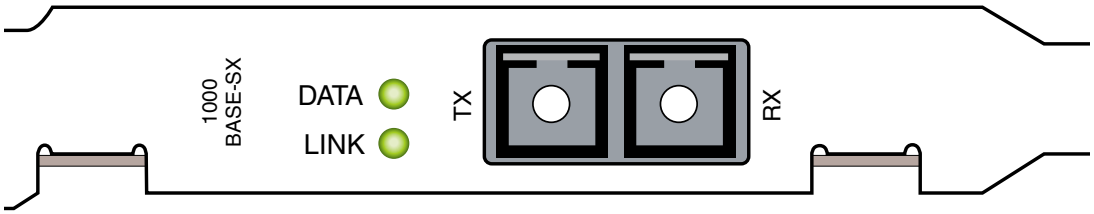
Verifying NIC Functionality

1000Base-SX NIC



Connectors

The faceplate of the NIC has one 1000Base-SX fiber-optic connector for connecting the NIC to a Gigabit Ethernet segment.

LEDs

There are two LEDs on the faceplate: one to indicate link status and one for data transfer status. Once the NIC hardware and its driver software have been properly installed on your system, the LEDs indicate the following NIC states:

1000Base-SX NIC Port LED Activity

LED	State	Description
Data	Blinking	Data detected on the port.
	On	Data detected on the port.
	Off	No data detected on the port.
Link	Blinking slowly	Port has been disabled by software.
	On	Good link.
	Off	No link; possible bad cable, bad connector, or configuration mismatch.

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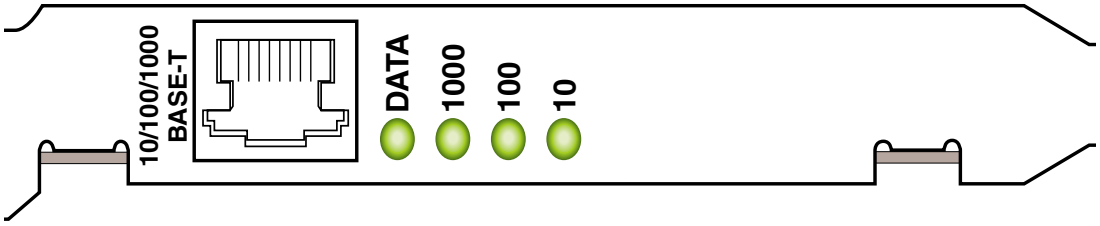
10/100/1000Base-T NIC



Connectors

The faceplate on the 10/100/1000Base-T NIC provides an RJ-45 connector for connecting the NIC to another network device.

LEDs

The faceplate of the 10/100/1000Base-T NIC has four LEDs: one for each port speed option (10Mbps, 100Mbps, and 1Gbps), to indicate which link is active, and one LED for data transfer status. Until the driver software is properly installed, all four LEDs remain lit when the server is powered on.

Once the NIC hardware and its driver software have been properly installed on your system, the LEDs indicate the following NIC states:

10/100/1000Base-T Port LED Activity

LED	State	Description
Data	Blinking	Brief bursts of data detected on the port.
	On	Streams of data detected on the port.
	Off	No data detected on the port.
1000	On	Good 1000 Mbps (Gigabit) Ethernet link.
	Off	No 1000 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.
100	On	Good 100 Mbps Fast Ethernet link.
	Off	No 100 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.
10	On	Good 10 Mbps Ethernet link
	Off	No 10 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.

If all four LEDs remain lit simultaneously, the NIC driver software is either missing or improperly installed.

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3 Installing Dynamic*Access* Software

WARNING: If you are using VLANs or teaming, you cannot use 3Com Dynamic*Access* software.

If you have intermediate drivers for any third-party NICs installed, it will cause a conflict with the 3Com Dynamic*Access* intermediate drivers. Remove those intermediate drivers.

About Dynamic*Access* Software

3Com Dynamic*Access* technology with advanced server features adds intelligence to the NICs to improve network performance, management, and control.

Dynamic*Access* software is supported on PCs running Windows 2000 or Windows NT 4.0 only.

NOTE: This section describes how to install Dynamic*Access* software. For detailed information and configuration or troubleshooting instructions, see the *DynamicAccess Software User's Guide* located on the 3Com Gigabit EtherLink Server NIC CD.

Dynamic*Access* server features relieve network congestion and ensure high performance and maximum bandwidth availability.

- Self-healing drivers (SHD) detect common error conditions and correct them while maintaining server link.
- Load balancing groups share the network load over multiple NICs. Called Resilient Server Links (RSL), they keep traffic flowing even if a NIC in a group is temporarily disconnected.
- VLANs (IEEE 802.1Q and IEEE 802.3ac multiple virtual LANs) let you divide network segments into logical partitions that simplify configuration changes, organize work groups efficiently, help to control traffic, and provide extra security.
- Traffic prioritization (IEEE 802.1p) ensures that business-critical and delay-sensitive traffic (such as multimedia applications) have priority over normal data.

For detailed information on Dynamic*Access* technology products, go to:

http://www.3com.com

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Installing Dynamic*Access* Software in Windows NT 4.0 or Windows 2000

For Windows NT 4.0, Dynamic*Access* software requires Service Pack 6.0a or higher.

Follow these steps for installing Dynamic*Access* software for a server NIC in a WIndows 2000 or Windows NT 4.0 computer:

1. **Make sure that the NIC and the network driver are installed.**
2. **Start your Windows system and log in.**

   You must have Network Administrator privileges to install the Dynamic*Access* software.
3. **Insert the 3Com Gigabit EtherLink Server CD into the system CD-ROM drive.**
4. **Enter the proper path for your operating system, where e:\ is the designation of the CD-ROM drive on your system:**

- Windows 2000:

  `e:\DA\Win2K\dasetup.exe`
- Windows NT 4.0:

  `e:\DA\NT20\daserver.exe`

5. **Click *Install DynamicAccess Technology*.**
6. **When prompted, click (*Yes*) Install Dynamic*Access* Technology.**

   When Dynamic*Access* server features are installed for Windows 2000, LAN connections bind to the Dynamic*Access* protocol and real protocols bind to the Dynamic*Access* Miniport. Do not modify these binding.

   When Dynamic*Access* features are installed for Windows NT 4.0 Server, adapters bind to the Dynamic*Access* protocol and real protocols bind to the Dynamic*Access* Miniport. Do not modify these bindings.

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A Specifications

1000Base-SX Cable Characteristics

Medium Diameter		Frequency	Cable Type	Operating Range
SX	62.5 Microns	Shortwave (850 nanometers)	Multimode fiber	2 to 275 meters (6.5 to 902 feet)
	50 Microns	Shortwave (850 nanometers)	Multimode fiber	2 to 550 meters (6.5 to 1804 feet) (in compliance with IEEE 802.3-1999)

10/100/1000Base-T Cable Characteristics

Port Type	Connector	Media	Maximum Distance
10Base-T	RJ-45	Cat. 3, 4, or 5 UTP	100 meters (325 feet)
100/1000Base-T	RJ-45	Cat. 5 UTP	100 meters (325 feet)

NOTE: 1000Base-T signaling requires four twisted pairs of Category 5 balanced cabling, as specified in ISO/IEC 11801:1995 and ANSI/EIA/TIA-568-A (1995) and tested for additional performance using testing procedures defined in TIA/EIA TSB95.

Performance Specifications

Feature	Specification
PCI clock	66 MHz max
PCI Data/Address	32- and 64-bit
PCI data burst transfer rate	132 MB/second (32-bit bus) 264 MB/second (64-bit bus) 528 MB/second (64-bit bus at 66 MHz)
PCI modes	Master/slave
10/100/1000Base-T	10/100/1000 Mbps (full duplex)

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Physical Characteristics

Dimension	Measurement
PCI Length x Width	17.27 cm x 10.67 cm (6.8" x 4.2")

Power Requirements

Specification	Measurement
PCI operating voltage	+5 V ± 5%
PCI power consumption	14 Watts 2.8A @ +5VDC

Environmental Specifications

Condition	Operating Specification	Storage Specification
Temperature	0˚C to 55˚C (+32˚F to +131˚F)	–40˚C to +85˚C (–40˚F to +185˚F)
Relative humidity	5% to 85% (non-condensing) 40˚C, 16 hour dwells at extremes	5% to 95% (non-condensing) 10˚C/hour
Altitude	Up to 3,048 meters (10,000 ft.)	Up to 10670 meters (35,000 ft.)
Shock	10g, 1/2 sine wave, 11 msec	60g, 1/2 sine wave, 11 msec
Vibration, peak to peak displacement	0.0127 cm. (0.005 in.) max (5 to 32 Hz)	0.2540 cm. (0.1 in.) max (5 to 17 Hz)
Vibration, peak acceleration	0.25g (5 to 500 Hz) (Sweep Rate = 1 octave/min.)	0.25g (5 to 500 Hz) (Sweep Rate = 1 octave/min.)

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Warranty and Software License Agreement

3Com Corporation Limited Warranty

3Com Gigabit EtherLink Server Network Interface Cards (NICs)

HARDWARE

3Com warrants this hardware product to be free from defects in workmanship and materials, under normal use and service, for the following length of time from the date of purchase from 3Com or its authorized reseller:

Three (3) years

3Com's sole obligation under this express warranty shall be, at 3Com's option and expense, to

repair the defective product or part, deliver to Customer an equivalent product or part to replace the defective item, or if neither of the two foregoing options is reasonably available, 3Com may, in its sole discretion, refund to Customer the purchase price paid for the defective product. All products that are replaced will become the property of 3Com. Replacement products may be new or reconditioned.

3Com warrants any replaced or repaired product or part for ninety (90) days from shipment, or the remainder of the initial warranty period, whichever is longer.

SOFTWARE

3Com warrants that each software program licensed from it will perform in substantial conformance to its program specifications, for a period of ninety (90) days from the date of purchase from 3Com or its authorized reseller. 3Com warrants the media containing software against failure during the warranty period. No updates are provided. 3Com's sole obligation under this express warranty shall be, at 3Com's option and expense, to refund the purchase price paid by Customer for any defective software product, or to replace any defective media with software which substantially conforms to applicable 3Com published specifications. Customer assumes responsibility for the selection of the appropriate applications program and associated reference materials. 3Com makes no warranty or representation that its software products will meet Customer's requirements or work in combination with any hardware or applications software products provided by third parties, that the operation of the software products will be uninterrupted or error free, or that all defects in the software products will be corrected. For any third party products listed in the 3Com software product documentation or specifications as being compatible, 3Com will make reasonable efforts to provide compatibility, except where the non-compatibility is caused by a "bug" or defect in the third party's product or from use of the software product not in accordance with 3Com's published specifications or user manual.

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Customer must contact a 3Com Corporate Service Center or an Authorized 3Com Service Center within the applicable warranty period to obtain warranty service authorization. Dated proof of purchase from 3Com or its authorized reseller may be required. Products returned to 3Com's Corporate Service Center must be pre-authorized by 3Com with a Return Material Authorization (RMA) number marked on the outside of the package, and sent prepaid and packaged appropriately for safe shipment, and it is recommended that they be insured or sent by a method that provides for tracking of the package. The repaired or replaced item will be shipped to Customer, at 3Com's expense, not later than thirty (30) days after 3Com receives the defective product.

Dead- or Defective-on-Arrival. In the event a product completely fails to function or exhibits a defect in materials or workmanship within the first forty-eight (48) hours of installation but no later than thirty 30) days after the date of purchase, and this is verified by 3Com, it will be considered dead-or defective-on-arrival (DOA) and a replacement shall be provided by advance replacement. The replacement product will normally be shipped not later than three (3) business days after 3Com's verification of the DOA product, but may be delayed due to export or import procedures. When an advance replacement is provided and Customer fails to return the original product to 3Com within fifteen (15) days after shipment of the replacement, 3Com will charge Customer for the replacement product, at list price. 3Com shall not be responsible for any software, firmware, information, or memory data of Customer contained in, stored on, or integrated with any products returned to 3Com for repair, whether under warranty or not.

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GOVERNING LAW

This Limited Warranty shall be governed by the laws of the State of California, U.S.A. excluding its conflicts of laws principles and excluding the United Nations Convention on Contracts for the International Sale of Goods.

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Santa Clara, CA 95054
(408) 326-5000

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FCC Class B Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1 This device may not cause harmful interference, and

2 This device must accept any interference received, including interference that may cause undesired operation.

WARNING: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules, and the Canadian Department of Communications Equipment Standards entitled, "Digital Apparatus," ICES-003.These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from the one which the receiver is connected to.
- Consult the dealer or an experienced radio/TV technician for help.

The user may find the following booklet prepared by the Federal Communications Commission helpful:

The Interference Handbook

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 004-000-00345-4.

NOTE: In order to maintain compliance with the limits of a Class B digital device, 3Com requires that you use quality interface cables when connecting to this device. Changes or modifications not expressly approved by 3Com could void the user's authority to operate this equipment. Refer to the manual for specifications on cabling types.

FCC Declaration of Conformity

We declare under our sole responsibility that the

Model:	Description:
3C985B-SX	Gigabit EtherLink Server NIC
3C986-T, 710024, 710025	10/100/1000BASE-T PCI NIC
710011, 710012	1000BASE-SX PCI Fiber NIC
710026	1000BASE-LX PCI Fiber NIC

to which this declaration relates, is in conformity with the following standards or other normative documents:

- ANSI C63.4-1992 Methods of Measurement
- Federal Communications Commission 47 CFR Part 15, subpart B

15.107 (e) Class B Conducted Limits

15.109 (g) Class B Radiated Emissions Limits

3Com Corporation, 5400 Bayfront Plaza, P.O. Box 58145, Santa Clara, CA 95052-8145

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